1 Identification of substance:
Product details:
Product name: Dichloromethane
Stock number: 22917
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Emergency Phone: (978) 521-6300
CHEMTREC: (800) 424-9300
Web Site: www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency information:
During normal hours the Health, Safety and Environmental Department. After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:
Chemical characterization:
Description: (CAS#)
Dichloromethane (CAS# 75-09-2), 100%
Identification number(s):
EINECS Number: 200-838-9
EU Number: 602-004-00-3

3 Hazards identification
Hazard description:
Xn Harmful
Information pertaining to particular dangers for man and environment
R 40 Limited evidence of a carcinogenic effect.
Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

4 First aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

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After swallowing Seek immediate medical advice.
Information for doctor
The following symptoms may occur:
Nausea
Dizziness
Headache
Breathing difficulty
Gastric or intestinal disorders.

5 Fire fighting measures
Suitable extinguishing agents
Carbon dioxide
Fire-extinguishing powder
Dry sand
Special hazards caused by the material, its products of combustion or resulting gases:
In case of fire, the following can be released:
Carbon monoxide (CO)
Hydrogen chloride (HCl)
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures
Person-related safety precautions:
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.
Measures for cleaning/collection:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Additional information:
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage
Handling
Information for safe handling:
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Information about protection against explosions and fires:
No special measures required.
Storage
Requirements to be met by storerooms and receptacles:
No special requirements.

(Contd. on page 3)
Information about storage in one common storage facility:
Store away from oxidizing agents.

Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:

Dichloromethane

<table>
<thead>
<tr>
<th></th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV</td>
<td>50</td>
</tr>
<tr>
<td>Austria MAK</td>
<td>100</td>
</tr>
<tr>
<td>Belgium TWA</td>
<td>50</td>
</tr>
<tr>
<td>Denmark TWA</td>
<td>35</td>
</tr>
<tr>
<td>Finland TWA</td>
<td>100; 250-STEL</td>
</tr>
<tr>
<td>France VME</td>
<td>50; 100-VLE, C3 carcinogen</td>
</tr>
<tr>
<td>Germany MAK</td>
<td>100; Carcinogen</td>
</tr>
<tr>
<td>Hungary</td>
<td>10 mg/m3-STEL; Carcinogen</td>
</tr>
<tr>
<td>Japan OEL</td>
<td>50</td>
</tr>
<tr>
<td>Korea TLV</td>
<td>50; Confirmed animal carcinogen</td>
</tr>
<tr>
<td>Netherlands MAC-TGG</td>
<td>100; 500-MAC-K</td>
</tr>
<tr>
<td>Norway TWA</td>
<td>35</td>
</tr>
<tr>
<td>Poland TWA</td>
<td>20 mg/m3; 50 mg/m3-STEL</td>
</tr>
<tr>
<td>Russia TWA</td>
<td>100; 50-STEL</td>
</tr>
<tr>
<td>Sweden NGV</td>
<td>35; 70-KTV (skin)</td>
</tr>
<tr>
<td>Switzerland MAK-W</td>
<td>100; 500-KZG-W</td>
</tr>
<tr>
<td>United Kingdom TWA</td>
<td>100; 300-STEL</td>
</tr>
<tr>
<td>USA PEL</td>
<td>500</td>
</tr>
</tbody>
</table>

Additional information: No data

Personal protective equipment

General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Do not inhale gases / fumes / aerosols.

Breathing equipment:
Use suitable respirator when high concentrations are present.
Refer to 29CFR1910.1052 for regulations on respiratory protection required during exposure to dichloromethane

Protection of hands: Impervious gloves
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties:

Form: Liquid

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<table>
<thead>
<tr>
<th>Color:</th>
<th>Colorless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor:</td>
<td>Ether-like</td>
</tr>
</tbody>
</table>

| Change in condition | Melting point/Melting range: | -97°C (-143°F) |
|                    | Boiling point/Boiling range:  | 39.8-40°C (104-104°F) |
|                    | Sublimation temperature / start: | Not determined |

| Flash point: | Not applicable |
|             | Not determined |

| Ignition temperature: | 661°C (1222°F) |
|                       |                |

| Decomposition temperature: | Not determined |
|                            |                |

| Danger of explosion: | Product does not present an explosion hazard. |
|                      |          |

| Explosion limits:   |                |
|                     |                |
| Lower:              | 14 Vol %       |
| Upper:              | 22 Vol %       |

| Vapor pressure at 22°C (72°F): | 505 hPa (379 mm Hg) |
|                                |                    |

| Density at 20°C (68°F): | 1.325 g/cm³ |
|                        |            |

| Solubility in / Miscibility with Water: | Slightly soluble |
|                                         |                |

10 Stability and reactivity

Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.

Materials to be avoided:
Oxidizing agents
Alkali metals
Heat
Aluminum/aluminum alloys.

Dangerous reactions
Toxic fumes may be released if heated above the decomposition point

Dangerous products of decomposition:
Carbon monoxide and carbon dioxide
Hydrogen chloride (HCl)
Phosgene

11 Toxicological information

Acute toxicity:

<table>
<thead>
<tr>
<th>LD/LC50 values that are relevant for classification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
</tr>
<tr>
<td>LD50 1600 mg/kg (rat)</td>
</tr>
<tr>
<td>LDLo 357 mg/kg (hmn)</td>
</tr>
<tr>
<td>LC50 52000 mg/m3 (rat)</td>
</tr>
<tr>
<td>LC50/7H 14400 ppm/7H (mus)</td>
</tr>
<tr>
<td>Inhalative</td>
</tr>
<tr>
<td>Irritation of skin moderate 100 mg/24H (rbb)</td>
</tr>
<tr>
<td>Irritation of skin severe 810 mg/24H (rbb)</td>
</tr>
<tr>
<td>Irritation of eyes mild 10 mg (rbb)</td>
</tr>
</tbody>
</table>

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Product name: Dichloromethane

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<table>
<thead>
<tr>
<th>Primary irritant effect:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>on the skin:</strong> Irritant to skin and mucous membranes.</td>
</tr>
<tr>
<td><strong>on the eye:</strong> Irritating effect.</td>
</tr>
<tr>
<td><strong>Sensitization:</strong> No sensitizing effects known.</td>
</tr>
</tbody>
</table>

Other information (about experimental toxicology):
Mutagenic effects have been observed on tests with laboratory animals.
Reproductive effects have been observed on tests with laboratory animals.
Tumorigenic effects have been observed on tests with laboratory animals.
Carcinogenic effects have been observed on tests with laboratory animals.

Subacute to chronic toxicity:
Dichloromethane has strong narcotic effects. It is metabolized by the body producing carbon monoxide which reduces the oxygen carrying capacity of the blood. Exposure can lead to nausea, dizziness, headache and central nervous system disturbances. It is irritating to the skin and eyes. Chronic exposure may cause bronchitis, liver, kidney and pancreatic damage. Dichloromethane has caused carcinogenic, teratogenic and reproductive effects in laboratory animals. Memory loss, poor coordination, and reduced ability to think may result from brain damage. Dichloromethane may affect human sperm and can cross the placenta.

Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
EPA-B2: Probable human carcinogen, sufficient evidence from animal studies; inadequate evidence or no data from epidemiologic studies.
IARC-2B: Possibly carcinogenic to humans; limited evidence in humans in the absence of sufficient evidence in experimental animals.
NTP-2: Reasonably anticipated to be a carcinogen; limited evidence from studies in humans or sufficient evidence from studies in experimental animals.
Carcinogen as defined by OSHA.
ACGIH A3: Animal carcinogen: Agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product.

12 Ecological information:
General notes:
Do not allow material to be released to the environment without proper governmental permits.

13 Disposal considerations
Product:
Recommendation
Consult state, local or national regulations to ensure proper disposal.

(Contd. on page 6)
14 Transport information

DOT regulations:

Hazard class: 6.1
Identification number: UN1593
Packing group: III
Proper shipping name (technical name): DICHLOROMETHANE
Label 6.1

Land transport ADR/RID (cross-border)

ADR/RID class: 6.1 (T1) Toxic substances
Danger code (Kemler): 60
UN-Number: 1593
Packaging group: III
Description of goods: 1593 DICHLOROMETHANE

Maritime transport IMDG:

IMDG Class: 6.1
UN Number: 1593
Label 6.1
Packaging group: III
Proper shipping name: DICHLOROMETHANE

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class: 6.1
UN/ID Number: 1593
Label 6.1
Packaging group: III
Proper shipping name: DICHLOROMETHANE
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15 Regulations

Product related hazard informations:

Hazard symbols:
Xn Harmful

Risk phrases:
40 Limited evidence of a carcinogenic effect.

Safety phrases:
23 Do not breathe fumes
24/25 Avoid contact with skin and eyes.
36/37 Wear suitable protective clothing and gloves.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
This product contains a chemical known to the state of California to cause cancer or reproductive toxicity.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

Information about limitation of use:
For use only by technically qualified individuals.
This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Other regulations, limitations and prohibitive regulations
Refer to 29CFR1910.1052 for regulations on respiratory protection required during exposure to dichloromethane

16 Other information:
Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.
Contact: Darrell R. Sanders